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THE ATTITUDE OF THE SCIENTIST

Science must go its own gait, in its own way, and it often finds itself in a blind alley. It is trying; we wish it were otherwise; but it can not be helped. We can not trust the methods, dogmas or conclusions of authority in science. [Here he refers to the didactical statements of so-called "experts".]

Science bows down to truth and to truth alone; we have no apologies to make for its methods, its processes or its conclusions. The more we know about the complications and apparent contradictions of absolute truth, the more we distrust the cocksure and the authoritative settlement of scientific problems. To many minds authority points out the only satisfactory way and not only insists upon it, but cites volume, chapter and page to prove it, while science hesitates, vacillates, theorizes, and, brazenly or weakly, confesses its ignorance. There is no doubt about which one of those guides the crowd will follow, but neither is there any doubt about where a crowd, so led, must finally come out. Eca de Queroz quotes a learned writer as stating that "Adam, the father of men, was created October 28th at two o'clock in the afternoon." Here speaks authority, and we must confess that it offers us a clean-cut starting point for the human race that does away at a single stroke with the doubts and hesitations of modern science.

Compare this with the confession of a modern, conscientious physician who is called to attend a sick child. He asks a great many questions, he takes temperatures, and he does everything he can to discover the nature of the illness, and, finally, when asked point blank what ails the child, he replies: "Mrs. Bland, I'll be doggoned if I know what the matter is with the baby."—*John Casper Branner in Science.*

FRUIT INDUSTRIES FOR THE PHILIPPINES

There are few parts of the world where so great a profusion of fruits is to be found as in the Philippine Islands, yet there are few real fruit industries. Many of the fruits, which have formed the basis of important commerce in other tropical countries, grow here to perfection, yet no export fruit industries of importance have been developed, and even the home market is insufficiently supplied. The banana, for example, which abounds here in many varieties, flourishes in every back yard. Yet there is no export industry, and so great is the demand in the home market that the fruit sells in Manila at prices almost as high as are asked for it at times in some of the markets of the United States to which it has been brought from tropical countries, thousands of miles distant. The banana was one of the pioneers in tropical fresh fruit export industries. It is only about thirty years since this fruit was a rare novelty in the markets of the United States. The late Captain Baker, who was running a sailing vessel from Jamaica to Atlantic seaports, brought along with him on several trips a few bunches of bananas which sold readily in New York and other coast cities. This laid the foundation of an industry which has grown to enormous proportions and now employs scores of modern steamships to carry bananas to the principal seaports of the Atlantic and Gulf coasts, from which they are distributed to every town and hamlet in the United States. This tropical fruit can be produced and shipped so cheaply that it has ceased to be the rich man's luxury in the United States, thousands of miles from the plantations where it is grown, and has become the fruit for the common people, consumed as freely in the cities as the fruit of the temperate zone, grown nearby. With the rapidly awakening Orient acquiring new tastes and developing wealth with which to satisfy these desires, it would seem that opportunity offers for the building up in the future of commercial banana plantations for the supply of these new markets.

Even the mango, for which the Philippines have become renowned, is being little grown as a commercial industry, and practically no export trade has been developed. Considering the high prices which the carabao variety commands, it would seem that small commercial orchards ought to pay handsome returns if only the home market is considered, while the possibilities of foreign markets have scarcely been thought of.

The avocado, a fruit which feeds millions of people in the American tropics and is so rapidly springing into commercial importance, is comparatively a recent introduction but has proved itself to be adapted to the climatic and soil conditions of many parts of the Philippines, and will, unquestionably become an important Philippine product in the future. It has perhaps larger possibilities than any recently introduced fruit as a source of food supply for our own population and is capable of being exported thousands of miles to lands where it cannot be successfully grown.

The remarkable opportunities which appear to exist here for the development of the pineapple industry are only beginning to be realized. Pineapples were seen by the writer at the 1920 Carnival in Manila equal to those which have made Hawaii famous, and have formed a basis of an industry which has developed in that little island group by rapid strides until it has become second only to cane among the agricultural industries of that Territory. The vast areas which

exist in the Philippines, apparently well adapted to the crop, offer an inviting field for large development.

These are but a few suggested possibilities in the line of tropical fruit growing for the Philippines. Space will not permit here to enter into a discussion of each of the possible commercial fruits. The citrus, the lanzones, the santols, the mangosteens, the papayas, and many others might each be made the subject of an extended article. The possibilities of canned and manufactured products of many of these fruits is worthy of careful consideration.

Enough has been said to indicate that the Philippine Islands offer large opportunities for development of fruit industries to the great benefit of the entire population of fruit consuming people and to the commercial profit of those who judiciously enter into the business with the knowledge of how it ought to be carried on.

J. E. Higgins
Of the Department of Agronomy.

What we know is little enough, what we don't know is immense.—*Laplace.*

POMOLOGICAL STUDY OF SOME PHILIPPINE FRUITS[1]

By LEON B. VILLANUEVA

THREE PLATES

The fruit industry in the Philippines, considered from a commercial standpoint, is still in its infancy. There are only three places in the Islands where a considerable area is devoted to fruit culture. These are: the orange district of Tanauan, Batangas; the lanzon district of Laguna; and the mango district of Cavite.

Practically all the fruits produced in the Philippines are absorbed by the local markets, and the Philippines import preserved fruits and nuts. According to recent statistics (1) this importation amounted in 1919 to ₱1,352,904. All these facts tend to show the need of developing the fruit industry in this country. It is believed that the popularizing of the unknown fruits will tend toward this end.

The present work is an attempt to discover among the wild fruits some of the valuable kinds and study their possibilities; to describe Philippine fruits hitherto undescribed; to further investigate the slightly known but unfamiliar fruits; and to find among the described and better-known species the best possible forms for propagation.

REVIEW OF FRUIT STUDIES

De Leon (2) describes seventeen species of the commonest fruits in the Philippines and groups them under different forms. His list is as follows:

Achras sapota Linn. (Chico)
Anona squamosa L. (Atis)
Anona muricata L. (Guanabano)
Anona reticulata L. (Anona)
Antidesma bunius Spreng. (Bignay)
Averrhoa carambola L. (Balimbing)
Artocarpus integrifolia L. (Nangca)
Calamus ornatus philippinensis Becc. (Bejuco Rattan)
Dillenia philippinensis Rolfe. (Catmon)
Dillenia reifferscheidia F. Vill. (Dillenia speciosus) (Catmon Calabao)
Diospyros discolor Willd. (Mabolo)
Diospyros ebenaster Retz. (Sapote Negro)
Eugenia javanica L. (Macopa)
Lansium domesticum Jack. (Lanzon)
Lucuma mammosa Gaertn. (Chico Mamey)
Mangifera indica L. (Mango)
Sandoricum koetjape (Burm. F.) Merr. (Santol)
Spondias purpurea L. Sirihuelas

In this work, there is described a wide range of variation in form and flavor with some forms much more highly desirable than others. The mango in the

[1] Thesis presented for graduation from the College of Agriculture, No. 117; Experiment Station contribution, No. 43.

Philippines, he says, is noted for its excellent flavor and texture but only the best varieties possess these characteristics.

Another important contribution on fruit studies is that prepared by Wester (3). He describes the following fruits:

Aegle marmelos Corr. (Bael)
Gnetum gnemon L. (Banago)
Rollinia orthopetala A. DC. (Biriba)
Anona cherimolia Mill. (Cherimoya "Giant")
Eugenia jambolana Lam. (Genipa)
Psidium molle Bertol. (Guisaro)
Spondias cytherea Sonn. (Hevi)
Dillenia indica L. (Hondapara)
Aberia gardnerii Clos. (Ketembilla)
Calamus sp. (Litoco)
Malpighia glabra L. (Malphi)
Flacourtia cataphracta Roxb. (Paniala)
Anona montana Macf. (Maron)
Pereskia aculeata Mill. (Pereskia)
Eugenia uniflora L. (Pitanga)
Citrus decumana Murr. (Pomelo, Siam)
Cecropia palmata Willd. (Yuruma)

Brill (3) found the following percentage of the edible portion in a number of fruits:

Bael—52% of the weight of the fruit.
Banago—74% of the dried nut or seed.
Genipa—70% edible portion; 30% seeds and peel.
Cherimoya "Giant"—84% edible portion; 1.83% protein; 18.41% sugar; Trace of acid.
Hevi—65% of the total weight of the fruit.(3)
Pitanga—90% of the fruit is edible. (3)
Malpi—Malpis grown inFlorida of which the pulp was analyzed by Gore (3) gave the following percentage composition:
6.77% soluble solids.
1.13% insoluble solids.
1.39% acid (as malic)
2.44% total invert sugar.
0.21% nitrogen.
0.62% ash.

Pratt and Rosario (4) also determined the percentage composition of duhat (*Eugenia jambolana*) and found it to be:

12.70% sugar.
88% acidity as (malic).
.81% protein.

A considerable number of new fruits are to be found in Barrett's (5) list of "some new and little known Philippine economics" which is as follows:—

Gnetum scandens Roxb. (Culiyat)
Eleagnus philippense Perr. (Aliñgaro)
Diplodiscus paniculatus Turcz. (Balubo)

Eugenia sp. (Balubat)
Cubilia blancoi Blume. (Cubile)
Semecarpus cuneiformis Blanco (Ligas)
Alpinia elegans K.-Sch. (Talbac)
..... (Tiquis-tiquis)
Terminalia edulis Blanco (Calompit)
Eugenia calubcob C. B. Rob. (Calubcub)
Psychotria sp. (Tagpo)
Mimusops elengi L. (Cabiqui)
Rubus rosaefolius Smith (Sapimit)
Embelia philippinensis Meg. (Decay)
..... (Ayong Bilog)
Tetrastigma barmandii Pl. (Ayong Lapad)
Ficus spp. (Tibig)
Capparis horrida L. (Dauag)
Sterculia foetida L. (Babog)
Sandoricum koetjape Merr. (Santol)
Diospyros ebenaster Retz. (Sapote Negro)
Genipa americana L. (Genipap)
..... (Galo)
Nephelium mutabile Bl. (Laguan)
Cyrtosperma merkusii Schoot. (Palauan)
Amorphophallus campanulatus Blume. (Puñgapung)
Calamus mollis Blanco (Uay)
Calamus albus Pers. (Palasan)
Trichosanthes anguina L. (Pacupis or Snake cucumber)
Myristica sp. (Alubihod or Talang-talang)
Lucuma mammosa Gaertn. (Chico Mamey)
Trichosanthes sp. (Buyoc-buyoc)

Pratt and Rosario (4) determined the composition of a number of Philippine fruits besides that of "duhat". They found that different varieties contain different percentages of edible portion of the fruits, and that all varieties of fruit contain a high percentage of water with sugar and acid together with small amount of mineral matter in solution. Pectine and pectose are also present in fruits. Fruits also contain protein, carbohydrate, and fats but in comparatively low percentages. They found also that iron is present in almost all varieties of fruits.

The report of Wester (6) on citrus in the Philippines is a valuable contribution to Philippine pomology. He describes and illustrates ten varieties. In this report he includes observations on the susceptibility of this fruit plant to the disease known as citrus canker. This is a wide-spread disease of citrus which affects both the tree and the fruit.

MATERIALS USED IN PRESENT WORK

The materials for this work were secured mostly from different towns in the province of Cavite; from Calamba, Mount Makiling, and the College Farm, Laguna. The following are the materials collected:

Aglaia diffusa Merr. (Malasaguing)
Amaranthus spinosus L. (Bamban)

Averrhoa carambola L. (Balimbing)
Artocarpus camansi Blanco (Camansi)
Cubilia blancoi Blume. (Cubile)
Citrus sp. (Calamansi Castila)
Embelia philippinensis Mez. (Dicay)
Ficus ulmifolia Lam. (Isis)
Gnetum scandens Blume. (Culiyat)
Glycosmis cochinchinensis Pierre. (Guing-guing)
Kolowratia elegans Presl. (Tagbac)
Momordica cochinchinensis Spreng. (Buyoc-buyoc)
Nopalea cochinelifera Salm-Dyck. (Dilang-baca)
Pithecolobium dulce Benth. (Camanchiles)
Psychotria luconiensis F.—Vill (Tagpo)
Spondias purpurea L. (Sirguelas) Sirihuelas (Tag.)
Tamarindus indica Linn. (Sweet tamarind)
Triphasia trifoliata DC. (Limoncito)
Zizyphus jujuba Mill. (Manzanitas)
Tetrastigma harmandii Pl. (Ayong Lapad)
Cucurbita sp. (Bubuyoc (Tag.) (Caliat, (Il.)
..... (Galo)
Sterculia sp. (Pañgihan)
Alpinia brevilabris Presl. (Tamacunsing Pula)
Alpinia galanga Swartz. (Tamacunsing Puti)
Sterculia oblongata R. Br. (Uos or Noos)
Phyllanthus distichus Muell.—Arg. (Iba)

PROCEDURE

Sufficient samples of each species were secured for study. Each species was described with respect to shape, size, weight, surface, flesh, seeds and other minor characteristics. Drawings were made of a typical fruit of each species.

From three to twenty fruits were measured in each class.

DESCRIPTION OF MATERIAL

In describing color a standard book of colors was used as reference (7). Specimens, unfamiliar to the writer, were identified by reference to the College Herbarium and to Merrill's work (8). The latter was also made a source of botanical descriptions.

The following abbreviations are used in descriptions:

Sp.-Fil.	= Spanish-Filipino
Eng.	= English
Tag.	= Tagalog
Vis. or V.	= Visayan
Il.	= Ilocano
Pang.	= Pangasinan

1. Gubilla blancoi Blume. (Sapindaceae); Cubile (Tag.)—This promising fruit was recently discovered by Barrett (5) who furnishes a brief description of it. The fruit specimen used in the present work was taken from a very large and tall tree in Amadeo, Cavite. Lumbermen declare the tree to be good for

lumber. The tree is not common but is found wild along deep valleys in mountains. It is found on Mount Makiling. Seed were collected and given to the agronomy department. The plant is generally propagated by seed. The fruit is sold two for one centavo.

The fruit is similar in appearance to Alpay (*Nephelium glabrum* Noronh). but is larger. The outer coat is rough, usually dark green, having some protruding spine-like structures. Inside this coat is a white, fleshy, sweet and juicy mass which covers one-half of the entire portion of the seed or nut. The nut is dark red or ox-blood red and has a very pleasing taste and fine flavor when either boiled or roasted. The fruit weighs from 20.5 to 24.8 grams and the seeds are from 3 centimeters to 4 centimeters long and 2.6 centimeters to 3.8 centimeters in diameter. The seed is depressed at the point of attachment and covered with a very thin soft coating. The tree fruits seasonally in June and July.

2. Galo.—This fruit is from a tree of upright and robust growth which attains a height of from 8 to 15 meters. The tree is not cultivated extensively but is found growing wild along creeks. It is also found in half-open forests on hilly plains. One of the noteworthy characteristics of the tree is brittleness of its wood which renders the picking of the fruit rather difficult. It has received little attention since its discovery by Barrett with other new fruits in Cavite (5). Two forms of Galo have been found. One is rather small and round, the other large and tapering.

The fruit is green and has rather a smooth surface. The young fruit is very delicious when cooked. The mature nut-like seed can be eaten raw while the outer part or coat is eaten when cooked. The fruit weighs from 8 grams to 19.8 grams and the seeds are usually from 2 centimeters to 2.3 centimeters in length and from 1.5 centimeters to 2.3 centimeters in diameter. The tree usually bears fruit during the months of June and July. The plant is propagated by seed. The sample was taken from a tree in Amadeo, Cavite.

3. Gnetum scandens Roxb. (Gnetaceae); Culiat (Tag.); (Plate I, figure 5.)—A woody vine which is usually of the size of a man's arm or even larger and grows wild near big trees, along creeks. This plant sheds practically all its leaves at fruiting time.

The fruit is in a cluster which grows laterally on the main stem. The fruit is oblong, green when young and ox-blood red when ripe. The surface of the fruit is smooth and rather soft. The fruit is about 3 centimeters in length and 2 centimeters in diameter. It weighs about 6 grams. The seed is covered with yellow, juicy, fibrous pulp made up of hairy structures. The fruit can not be handled very conveniently as the hairy structures stick to the hand. Only the mature fruit is gathered and is boiled or roasted before being eaten. The seed coat is very hard when the fruit is fully mature. The seeds are oily and have an excellent flavor when roasted or boiled.

This plant is usually propagated by seed and is grown easily. It bears fruit during the months of June and August and rarely in January. The specimens were obtained from the town of Amadeo, Cavite. For further description, consult reference (5).

4. Kolowratia elegans Presl. (Zingiberaceae), (*Alpinia elegans* K. Sch.; Tagbak (Tag.), Talbak (Pamp.), Liguid-liguid and Tugisñgaisa (Vis.); (Plate III, figures 1, 2, and 3).—This tall herbaceous plant grows in forests along streams

in many parts of the Islands and usually attains a height of from about 2 to 5 meters. The leaves are used as roofing material for small huts. The stem of this plant can be used for binding and weaving. Barrett (5) mentions that a decoction made by boiling the roots was used to increase the inflammability of lint in producing fire without the aid of a match, probably because of some resinous or oily substance obtained from the boiling.

The fruit is borne in clusters on long peduncles which are terminal on the plant. Each fruit is usually oblong about 5 centimeters long, 3 centimeters in cross section and from 15 to 43 grams in weight. The fruit is dehiscent with hard coating or pericarp and smooth surface. The mature fruit is light yellow while the immature is green. It is provided with a sort of wing which protects the petal-like structure and the stigma. The ripe fruit is sweet and contains many small amber brown seeds covered with a white pulpy mass.

The plant bears fruit in abundance during the rainy season. For further botanical description see reference (5).

5. Momordica cochinchinensis (Lour.) Spreng. (Cucurbitaceae); Boyoc-boyoc (Tag.) Barbas-baquero (Sp.-Fil.).—An annual cucurbitaceous vine, which attains a diameter of about one inch and grows wild in thickets and forests of the Philippines. This plant is widely distributed in the Philippines, and extends to India, Southern China, and Malaya (8).

Barrett describes two forms of these climbing plants, one with striking scarlet or orange fruit, and the other with spherical fruit with dark red color. He claims that both types are edible but doubt seems to exist on this point. Some of the people who are acquainted with the fruits in their native habitat, claim that the one described in this study is the edible variety while the other is not. The seed of both is used for medicine.

The mature fruit varies in color from orange-red, carmine, to reddish-yellow depending upon the ripeness of the fruit; the fruit is large rather ovoid or subglobose with rough surface due to the spiny structures or tubercle-like spines on the fruit. The fruit of this annual vine is usually cooked green, when the seeds are still soft. It is not eaten when mature because the seeds are hard. The fruit is from 9 to 12 centimeters in length and from 8 to 9 centimeters in diameter. The weight varies from 250 to 260 grams. The seed is large, flattened and is covered with a soft reddish yellow mass. The plant is propagated by seed.

6. Amaranthus spinosus L. (Amaranthaceae); Banban, Bamban (Tag.), Ayontoto (Pamp.), Tilites (Vis.).—This is another important herbaceous plant growing along creeks or forest streams. It is a source of material for making baskets and for stringing tobacco leaves. The plant grows up to two meters and produces some small spreading branches on the axil of the main stem.

The fruit is sweet but rather dry, small, white when ripe, and borne on a long peduncle on the branches of the main stem. The fruit is indehiscent, with thin brittle membraneous pericarp and contains one hard seed. The fruit is about 1.2 to 1.4 centimeters long and 1.0 to 1.2 centimeters in diameter, and usually weighs from 0.6 to 0.9 grams. The fruit is rather round with smooth surface.

The seed in the majority of cases is ovate and rather compressed. The plant propagates itself by seed and by root-stocks.

7. Aglaia diffusa Merr. (Meliaceae); Malasaguing (Tag.); (Plate I, figures 1, 2, 3, and 4).—This is another valuable fruit tree growing wild on Mount

Makiling. The tree from which the specimen was obtained is rather large and, according to lumbermen, is good for timber.

The fruit is in clusters and is ovoid or round usually from 2.1 to 2.9 centimeters long and from 2.0 to 2.5 centimeters in diameter. The fruit weighs about 9 grams. The surface of the fruit is smooth with soft skin. The color of the ripe fruit is jasper red or grenadine red while that of the unripe is light green. The fruit is dehiscent and has from one to two-celled seeds. The seed is rather ovoid, flattened on one side, usually 2.8 centimeters long, and covered or surrounded with a sour, gelatinous, fleshy, white mass. The plant is propagated by seed.

According to Merrill (8) there are about one hundred species of Aglaia found in India, China, through Malaya to Australia, and Polynesia and about 40 species are known in the Philippines.

8. Artocarpus camansi Blanco. (Moraceae); Camansi, Camangsi (Tag.), Dulugian (V.T.), Camongsi, Pacao (Il.), Colo (Vis.), Ugod (Bicol); (Plate I, figures 6 and 7).—A large tree with milky juice similar to *Artocarpus incisa* in that it has spiny antocarps. The plant is not a native of the Philippines. However, it is grown and cultivated in many parts of the Islands for the fruit, which is good for food. The plant is also found in various forms in Malaya and Polynesia.

The fruit is usually sold for from 20 to 30 centavos a piece in the Manila market. It is subglobose to ellipsoid, from 13 to 15 centimeters in length and from 12 to 14 centimeters in diameter. It is green and with thin skin, covered with protruding, rounded to conical, tips or spines at the antocarps. The fruit weighs from 1303 to 1364 grams, and contains many ovoid or subglobose seeds similar to those of the jack fruit. The seed is from 2 to 3 centimeters in length and 2 centimeters in diameter. The flesh of the fruit is white and fibrous. The green fruit may be cooked and eaten or, when ripe the seeds if boiled furnish good food. The plant can be propagated by seed and by root-cuttings.

9. Ficus ulmifolia Lam. (F. sinuosa Miq.) (Moraceae) (Isis); Isis (Tag.), Hagupit (Vis.), Uplas (Il.).—This plant grows wild in thickets and forests throughout the Philippines. According to Merrill there are about 150 species of Ficus in the Philippines, many being erect shrubs and trees and others, vines. Among these species there are some edible ones which should be cultivated and improved. The edible species here described is grown on the College Farm.

Merrill in his *Flora of Manila* gives the description as follows: "A shrub usually from 3 to 5 meters high; leaves alternate, variable, very harsh, oblong, sub-entire or andulately lobed or coarsely toothed, sometimes deeply and narrowly lobed, accuminate, base rounded 3-nerved, often in equilateral, 9 to 17 centimeters long 4 to 8 centimeters wide."

The fruit is solitary owing to the axil of the leaves. It is very soft and fleshy when ripe, with very thin loose skin which is easily removed. The fruit is generally flattened, ellipsoid, and contain numerous tiny soft seeds. The fruit is usually from 1.4 to 2 centimeters thick, and 1.9 to 2 centimeters in diameter and usually weighs from 3.2 to 5.5 grams each. The flesh is juicy, sweet and orange red. The plant can be propagated by cuttings and, as shown by the experience of many, can easily be grown during the rainy season. There are two edible varieties.

10. Zizyohus jujuba Mill. (Rhamnaceae); Manchanitas (Tag.), Manzanas, Manzanitas (Sp. Fil.).—A small rather thorny and spreading tree. The

plant is found in the lowlands of Cavite province and is especially abundant in Caridad where the specimens herein described were obtained. It is also found in some places in Laguna province. There is one tree now bearing fruit in the orchard at the College of Agriculture. There is a considerable variability in forms and taste of the fruit existing at different places. Some are sweet, others are sour and acid.

The fruit is sold in Manila two for one centavo. It is sold in Caridad at a much lower price.

The species, according to Merrill, is a native of tropical Asia, being distributed from Afghanistan to China and through Malaya to Australia. It is found also in India and Ceylon.

There are four distinct forms or shapes of the fruit. The form may be oblong, ovate, spherical or conical. The base is rather hollow at the point of attachment to the stem. The apex is slightly depressed. The fruit is from 2.5 to 3 centimeters in length from 2 to 2.3 centimeters in diameter and usually weighs from 6 to 9 grams. The surface of the fruit is smooth and shiny; yellowish in color and with one fully developed hard seed. The fruit is fleshy and has a peculiar flavor.

It is said that in India the fruit affords a very nice dish when cooked with sugar. In Ceylon, the fruit is usually eaten raw as in the Philippines. The plants can be propagated by seed, by marcottage or by cuttings.

11. Averrhoa carambola L. (Oxalidaceae); Balimbing (Tag.), Balinbing (Sp.-Fil.), Carangan (Vis.).—A small tree, more or less ornamental in habit producing curious oblong shaped winged fruit on a long peduncle. There are two distinct varieties; one, sweet, and the other, sour. Both varieties are found in the Philippines. The specimen described is of the sour variety and came from a wild form.

According to Merrill (8) the plant is a native of tropical America and was introduced into the Philippines. The fruit is fleshy with 5 angular lobes, green when unripe and rather transparent greenish, yellow or amber when ripe. The fruit is juicy and very sour, usually about from 6 to 9 centimeters long and from 3 to 5 centimeters in diameter. The fruit usually weighs from 38 to 77 grams. The seeds are naked attached to the placenta and embedded in a soft albuminous mass. The fruit can be eaten as a vegetable cooked with fish or meat.

12. Psychotria luconiensis (Cham.) F.-Vill. (*P. tacpo Rolfe.*) (Rubiaceae); Tagpo, Tacpo, Lagpo (Tag.); (Plate II, figures 6, 7, 8, 9, and 10).—There are more than 500 species of the genus Psychotria, according to Merrill (8), in all tropical and sub-tropical countries. Some are used for medicinal purposes. There are more than 358 species in the Philippines. As far as the writer found in his investigation, there are two distinct types or varieties of *Psychotria luconiensis*, one producing large fruit and the other producing small fruit. The former is locally known as "Tagpong Calabao" and the latter, "Tagpong Aso". They both grow wild in the thickets and forests of the Philippines. The fruit of the large variety is more fleshy and sweeter than that of the small variety.

The shape of the fruit varies. Some may be obovoid or globose, others, oblong or ovoid. The fruit is yellow when unripe and reddish yellow when ripe. It is usually 0.9 centimeter long and 1.1 centimeters in diameter. The fruit is

borne in panicles of 5 or 9. Each fruit contains two seeds, rarely one. The seed is about 0.7 centimeter long and 0.6 centimeter wide. The plant is propagated by seed.

13. Tamarindus indica Linn. (Leguminosae); Sampaloc (Tag.), Tamarindo (Sp.), Sambag (Vis.), Salomague (Il.), Tamarind (Eng.).—This is a large tree with spreading branches and beautiful foliage bearing many different forms of pods. Some are oblong and rather short, others are very much curved. There are some sweet varieties as well as sour ones grown in different places of the Islands. The town of Malabon, Cavite, is noted for the sweet variety of sampaloc. There are also sweet varieties in Laguna. The species according to Merrill was introduced here many years ago and probably is a native of tropical Africa but now cultivated in all tropical countries.

The specimens here described are of the sweet variety and came from Biñang, Laguna. The pods are from 7 to 10 centimeters long and from 2 to 3 centimeters wide, weighing from 20 to 30 grams. The surface of the pods is rather compressed with thin crustaceous epicarp and a thick sweet pulpy mesocarp. Each fruit contains from 4 to 7 seeds.

The tamarind is generally sold in the form of green pods or in balls of ripe shelled fruits. Both the green and the ripe fruits have many uses. The young fruit and flowers are sold in the market and are eaten as a vegetable or used to flavor dishes.

The ripe fruit makes very pleasant cooling drinks when mixed with water and sugar. The plant is generally propagated by seed.

14. Citrus sp. (Rutaceae); Calamansing, Castila, Bilulu (Tag.)—Another very important but peculiar variety of citrus found in Tanauan, Batangas, is locally known as "Calamansing Castila". The pulp of this variety is extremely sour, even more so than the known and cultivated "Calamunding" (*Citrus mitis*) and "Dayap" (*Citrus lima*).

The fruit is globose, usually 3 centimeters in length, 4 centimeters in diameter and weighs from 34 to 38 grams. The fruit has the appearance of the cultivated mandarin orange. It is light yellow in color when ripe. The fruit is generally 12-celled but rarely 10-celled. The man from whom the specimen was bought gave the information that the fruit is generally used as a relish with some Chinese and native dishes which need some sour flavor. He further said that the fruit is used for shampoo, when mixed with "gogo". The latter is the bark of *Entada escandens*. The fruit of this variety of citrus is used in removing stains from cloth. The plant is propagated by seed.

15. Alpinia (Marantaceae) (Tamakunsi).—The plant commonly called Tamakunsi in Amadeo, Cavite, produces sweet fruit. The plant belongs to the family Marantaceae. In this work, there were found two different varieties of Tamakunsi which produce edible fruit. They are found in Cavite forests, in Laguna, and possibly in some other parts of the Islands. The fruit is abundant during the rainy season, especially in the months of August and October. Descriptions of two forms are here given.

16. Alpinia brevilabris Presl. (Marantaceae); Tamakunsing Pula (Tag.). —This herbaceous plant is very similar to ginger in appearance. The plant is erect, glabrous, with leafy-stem which grows from the thickened fleshy rootstocks from which also spring the fruit.

The fruit of this form is red or garnet brown, usually in bunches of from 4 to 7. The surface of the fruit is rough having some tiny protruding structures on the surface of the capsules.

The capsules are thin-walled, dehiscent, splitting into three valves. The fruit is sweet, juicy and contains many soft black seeds. The fruit is usually 1.1 centimeters in length and 1.3 centimeters in diameter. The bunch weighs from 6 to 7 grams. They are abundant during the months of August and October. The fruit is eaten by some wild animals. According to the writer's observation and taste the fruit would make a good preserve. The plant propagates by seed or by rootstock.

17. Alpinia galanga Swartz; Tamakunsing Pute or Langkuan (Tag.), Lanceas (Pamp.).—Another plant similar to Tamakunsing Pula is locally known as the Tamakunsing Pute. The plant grows taller than the Tamakunsing Pula, has a bigger stem and the leaves are larger, broader, and hairy. The fruit grows thickly around the plants in a compact clump on the rootstocks.

The fruit is larger and longer than those of Tamakunsing Pula and is provided with protruding wart-like structures on the capsules. The fruit is dehiscent. The fruit weighs from 1.5 to 2 grams and measures usually from 2.5 to 3 centimeters long and 1.3 to 1.6 centimeters in diameter. The fruit is white and the pulp appears like orange citrine with a pleasing aromatic taste. The ripe fruit is sweet and juicy with more soft seeds than the Tamakunsing Pula. The seed is amber brown. The plant is propagated by seed and by rootstocks.

18. Triphasia trifoliata DC. (Rutaceae); Limon China, Limoncito (Tag). —This is a low glabrous shrub which is provided with slender straight spines borne in pairs. It is sometimes cultivated in the Philippines but oftentimes found growing wild in thickets and similar places. It is widely distributed in the Islands. The specimens studied came from Bulan, Sorsogon.

According to Merrill (8) this species is generally cultivated in the tropics of the East and in some other tropical countries, it is probably a native of tropical Asia.

The fruit is ovoid or globose, usually 1.0 to 1.5 centimeters long and 0.8 to 1.2 centimeters in diameter and weighing from 0.8 to 1.2 grams. The fruit is green when unripe and red or spectrum red to carmine when ripe. The surface of the fruit has some gland-dotted marks. The fruit is rather sticky, fleshy, very aromatic and somewhat sour in taste. It contains one seed, rarely two which is usually from 0.7 centimeter to 0.9 centimeter in length and 0.5 centimeter in diameter.

According to Pratt and Rosario (4) the fruit is eaten in India.

19. Cucurbita sp.; Bubuyok, Layag (Tag.), Caliat (Cagayan), Caliot (Pang.).—This is a small trailing or climbing plant of the family Cucurbitaceae found wild in Philippine forests. The vine is provided with hairy-like structures or trichomes. The leaves are 3-lobe and hairy. The writer found the fruit to be edible.

The fruit is oblong, scarlet red or spectrum red and usually weighs from 15 to 20 grams. It is from 4.2 to 5.8 centimeters long and 2.3 to 3.8 centimeters in diameter. The surface of the fruit is smooth with slightly raised longitudinal linings. The apricot yellow pulp attached to the rind is thin. The fruit is indehiscent and contains many seeds usually embedded with juicy fibrous mass. The fruit is sweet and juicy when thoroughly ripe.

The seed is brownish olive and has protruding eye-like structures on both sides.

It is said that the Ilocanos in Cagayan eat the young or the succulent portion of the stem as a vegetable. The fruit is also eaten but rarely. The specimens described were obtained from plants growing along the hog fence at the College. The plant is propagated by seed.

20. Sterculia sp. (Sterculiaceae); Pañgihan (Tag.).—The fruit is similar to Oos from Bulan, Sorsogon, and is produced in long peduncled bunches of 3 to 4. The fruit opens longitudinally on one side of the fruit. The ripe fruit is jasper red to grenadine red, and the unripe fruit is green. The surface of the fruit is rough, in shape the fruit is rather depressed, oblong-ovate and usually weighs from 15 to 18 grams. The fruit is from 3.5 to 5 centimeters in length and from 2.7 to 3.5 centimeters in diameter. It contains from 4 to 8 seeds.

The mature seed is black while the immature one is white. The seed is from 1.4 centimeters to 1.8 centimeters in length and 1.1 centimeters to 1.3 centimeters in diameter. The seed is depressed and oblong-ovate. The seed is wholesome and contains a high percentage of oil which, according to the people in Indang, Cavite, is used for adulterating chocolate. The specimens described came from Indang, Cavite. The plant bears fruit during the months of January and February. It is propagated by seed.

21. Tetrastigma hermandii Pl.; Ayong Lapad (Tag.); (Plate III, figures 4, 5, 6, and 7.)—This is a woody vine of Philippine forests.

The fruit is usually in compact bunches, green when unripe and light brown or brownish-red when ripe. A bunch of fruit weighs about two kilograms. There are two distinct varieties of this species, both edible. The one here described is the large variety, the other is small. Each fruit weighs from 2 to 8 grams. The surface of the fruit is rough with thick skin. Inside the fruit is a white gelatinous soft mass which is sour and juicy. The fruit and the young leaves may be cooked with fish and meat.

Each fruit contains 2 or 3 grayish black seeds. The seed is rough, long and depressed.

The fruiting season is the month of August.

22. Embelia philippinensis Mez.; Decay (Tag.); (Plate II, figure 1).—This is a woody vine armed with sharp spines on the older portion of the stem. It grows wild in thickets and forests of the Philippines, and produces fruit heavily during the rainy season. The fruit is very small and is borne in heavy bunches hanging on a terminal stem of the plant. The fruit is green, soft, and juicy. Farmers who live in isolated places use the leaves and fruit to cook with fish and meat. The fruit is as large as the seed of mungo. The specimen here described was from Amadeo, Cavite. The plant is propagated by cuttings.

23. Glycosmis cochinchinensis (Lour.) Pierre (*G. Pentaphylla Correa* (Rutaceae); Guing-guing or (Ringui Tag.); (Plate II, figures 2, 3, 4, and 5).—This is a shrub widely grown in the Philippines and occasionally cultivated as a hedge. According to Merrill (8) the plant is also found in India, Malaya, and tropical Australia.

The fruit is berry-like in form, edible and varies in shape. Some are kidney-shaped, others oval and still others are round. The fruit is orange pink in color, fleshy, with sticky juice and sweet taste. The juice can be used as glue or paste.

The fruit is usually 0.7 centimeter long and 0.8 centimeter in diameter. It contains one single round brown seed.

The plant propagates by seed.

24. Sterculia oblongata R. Br. (Sterculiaceae); Uos or Noos (Bicol); (Plate III, figures 8, 9, and 10).—This is a tall tree which produces edible seed.

The fruit is grayish or light yellow and is borne in bunches of from 2 to 4. They are about 6 centimeters long and 3.6 centimeters wide and rather flat.

The seed is black, very oily and may be eaten when roasted. The Bicols use the leaves of this plant for making glue. The leaves are first powdered and then dissolved in hot water. Specimens were obtained from Camarines.

The plant is propagated by seed.

25. Nopalea cochinelifera (Mill.) Salm.-Dyck. (Cactaceae); Dilang-baca (Tag.).—This fleshy, erect, branchy, and leafless plant produces edible fruit. According to Merrill (8) the plant is a native of tropical America and was introduced in the Philippines where it is now cultivated. The green leaves are used for medicinal purposes.

The fruit is spectrum red or carmine usually 3.4 centimeters long and 2.7 centimeters in diameter. It is fleshy with a very thin coat, ovoid, usually depressed or having a hole at the botton of the fruit. The fruit weighs from 13.6 to 16 grams. The flesh is carmine while the central portion is ox-blood red. The flesh is juicy and sweet. The surface of the fruit contains hairy structures.

26. Spondias purpurea L. (Anacardiaceae); Sireguelas, Sirhuelas, Ciruela (Tag.).—A deciduous tree with stout trunk and stout spreading branches. This plant is extensively grown in the Islands. It is a native of tropical America, according to Merrill (8), and was introduced into the Philippines at an early date. There are two distinct types of fruit, one is the red and the other, the white.

The fruit is rather subglobose or roundish-oblong, is purplish-red, with depressed base and somewhat round apex. The fruit is usually 4 centimeters in length and 3.2 centimeters in diameter and weighs from 20 to 30 grams.

The fruit contains one large hard seed. The seed is fibrous outside and about 1.8 centimeters in length and 1.6 centimeters in diameter. April and May are the fruiting months.

The plant is propagated by cuttings.

27. Pithecolobium dulce (Roxb.) Benth. (Leguminoceae); Camastiles, Camachiles (Tag.), Camanchiles, Camonsil (Sp.-Fil.). A tree, armed with short, sharp and stipular spines. The plant is widely distributed in the Philippines and is especially abundant in Batangas province. The plant, according to Merrill (8) is a native of tropical America and is also found in India and Malaya. The fruit is edible and the bark is used in tanning.

The pods are rather smooth, turgid, twisted, oftentimes spiral. The pods are dehiscent along the border side. The exterior of the pods or valves is yellowish red when ripe and green when unripe. The spiral pods are usually from 10.9 centimeters to 24 centimeters long and from 1.6 centimeters to 2.5 centimeters in diameter. The pods weigh from 10.1 to 20.4 grams.

The seed is black and usually from 1.1 centimeters to 1.8 centimeters long and 0.6 centimeter wide. The seeds are covered with a soft, fleshy, whitish pulpy arillus. Each pod contains from 6 to 11 seeds. The plant bears fruit in abundance during the months of January and February.

Some varieties are sweet, while others are not. There are also early and late varieties.

The plant propagates by seed.

28. Phyllanthus distichus Muell. Arg. (Euphorbiaceae). (Iba); Yba (Tag.), Poras (Vis.).—A small, glabrous, deciduous tree, the branches of which are much thickened with pinnately arranged leaves borne at the ends of the branches. This plant is widely distributed in the Philippines and is found from India to Madagascar, and in Malaya and Polynesia (8). It was introduced into tropical America. The specimens studied came from Tanauan, Batangas.

The fruit is globose, pale-green or greenish-white about 1.2 centimeters in length and 1.5 centimeters in diameter. The surface of the fruit is rather smooth having some longitudinal depressions.

The fruit has a rather firm pulp, is acid and contains a hard, bony seed. The fruit is juicy, rather fleshy, and, according to Pratt and Rosario (4), it can be made into pickles or cooked with sugar. The plant is propagated by seed.

CONCLUSION

The results of these investigations show that in the Philippines there are many promising wild fruit plants which are practically unknown to the people. This paper reports the descriptions of 27 kinds of edible fruits, all found in the Philippines. Among the new or little known ones, described in this work, the best are the *Galo*, *Cubile*, *Culiat*, *Isis*, *Ayong-Lapad*, and *Tamakunsing Pute*.

In many Philippine fruits, both cultivated and wild, there was found a great deal of variation in form, size, quality, and other characteristics.

ACKNOWLEDGMENT

The writer wishes to express his obligations to Professor J. E. Higgins for criticisms on horticultural terminology and to Cornelio del Rosario and Crispulo Aguinaldo who made the drawings.

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ILLUSTRATIONS

Plate I

Aglaia diffusa Merr.; Malasaguing

Fig. 1. Exterior of a typical fruit x 1.
2. Cross-section of a fruit x 1.
3. Longitudinal section of a fruit x 1.
4. Cross-section of a fruit x 1.

Gnetum scandens Roxb.; Culiat

5. Exterior of a typical fruit x 1.

Artocarpus camansi Blanco; Camangsi

6. Exterior of a typical fruit x ½.
7. Longitudinal section of a fruit x ½.

Plate II

Embelia philippinensis Mez.; Decay

Fig. 1. A typical bunch of fruit x ⅜.

Glycomis cochinchinensis (Lour.) Pierre; Guing-guing or Ringui

2. Exterior of a typical fruit x 2.
3. Longitudinal section of a fruit x 2.
4. Exterior of a fruit x 2.
5. Longitudinal section of a fruit x 2.

Psychotria luconiensis (Cham.) F.-Vill.; Tacpo or Lagpo

Fig. 6. Typical fruit in a panicle x ½.
7. Seed, two valves x 2.
8. Exterior of a fruit x 1½.
9. Longitudinal section of a fruit x 1½.
10. Cross-section of a fruit x 1½.

Plate III

Kolowratia elegans Presl.; Tagbak.

Fig. 1. Exterior of a typical fruit x 1.
2. Cross-section of a fruit x 1.
3. Longitudinal section of a fruit x 1.

Tetrastigma harmandii Pl.; Ayong Lapad

4. A typical bunch of fruit x ½.
5. Longitudinal section of a fruit x 1.
6. Exterior of a fruit x 1.
7. Cross-section of a fruit x 1.

Sterculia oblogata R. Br.; Uos or Noos

8. A typical bunch of fruit x ½.
9. Longitudinal section of a fruit x ½.
10. Cross-section of a fruit x ½.

(Drawings by Cornelio R. del Rosario.)

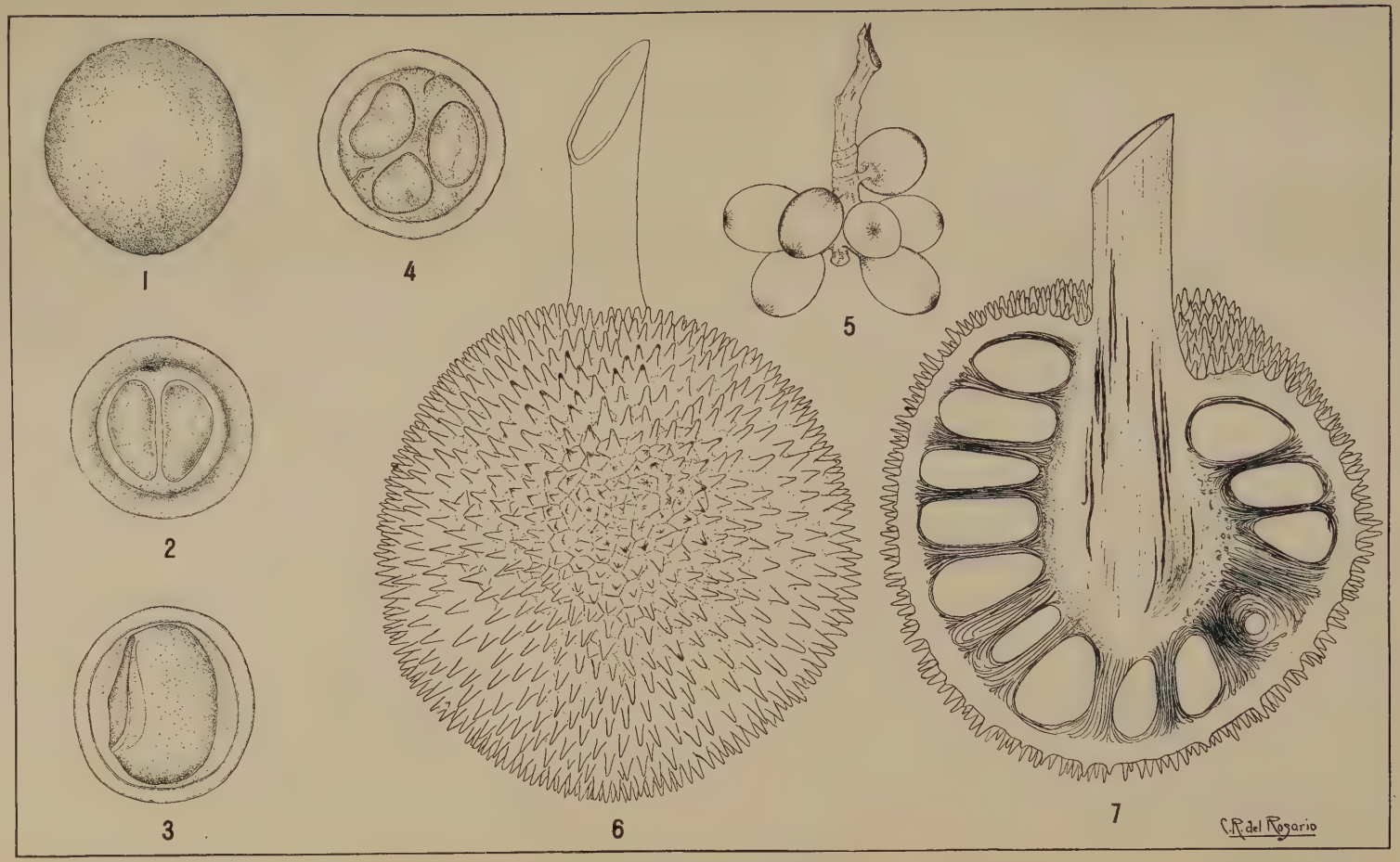

PLATE I. PHILIPPINE FRUITS.

PLATE II. PHILIPPINE FRUITS.

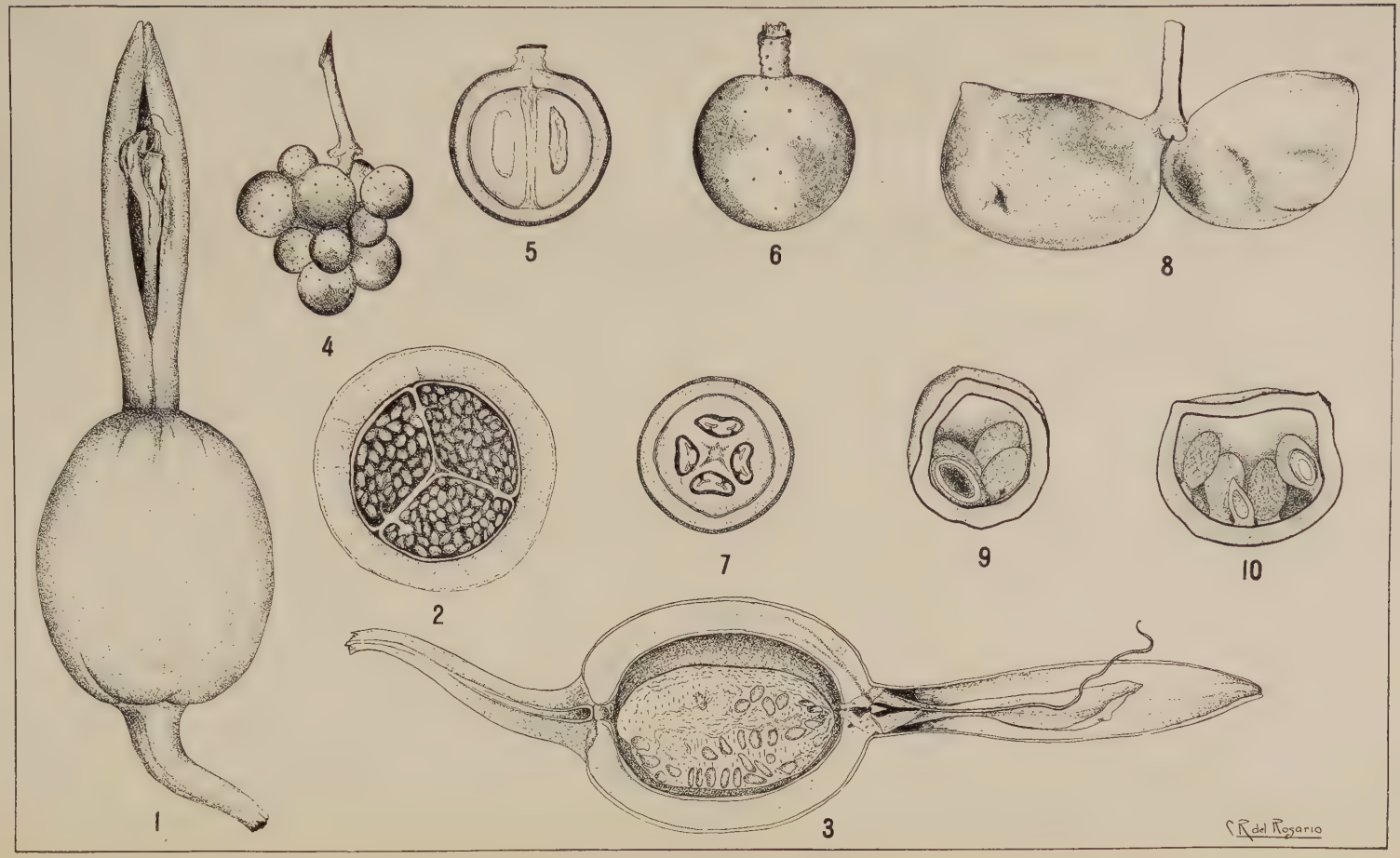

PLATE III. PHILIPPINE FRUITS.

REVIEW OF "A PRACTICAL GUIDE TO COCONUT PLANTING"[1]

By J. E. Higgins

Of the Department of Agronomy

This volume of about 200 pages which has just come to our desk is a second edition of the work which first appeared in book form in the year 1916, as an enlargement of Mr. Brown's bulletin on the same subject, published by the Government of the Federated Malay States. The book is not designed as a statement of principles, but as a practical guide to planters as indicated in the title and the authors modestly disavow any claim that the practices advocated will apply in all coconut growing countries. It is intended as a guide to planters in the Malay Archipelago, Sumatra, and Borneo. The book is born of experience and close observation in those countries and the authors speak with assurance of the applicability of their instructions there. The reader, however, is impressed with the fact that coconut growers in all parts of the world will find much valuable information throughout these pages. Brief and concise chapters are to be found upon nearly all phases of coconut culture from the selection of the land to the curing of the copra for market with quite an extended chapter on the pests and diseases, and the methods of control which have proved most effective. Mention is made of a report of the appearance of a coconut bud disease in Penang which will certainly be watched with care because of its possible identity with the dreaded budrot disease of the West Indies.

Although the book is not addressed to the investor, the business side of coconut culture has not been overlooked and the entire work is written from the standpoint of profitable production, special emphasis being laid upon the selection of the right place and the right *manager* for the plantation. The probable costs of different operations are indicated and a separate chapter on estimates of costs and probable returns is given. The authors estimate a yield of 500 nuts per acre for the sixth year after planting, 1000 nuts for the seventh year and so on up to 2,500 nuts for the twelfth year, the average plantations not becoming self-supporting under seven and a half years unless subsidiary crops, such as coffee, tea, or tapioca, are resorted to and this practice the authors look upon as not to be recommended unreservedly. The value of cover crops, however, as intercultures is strongly emphasized, some of the most successful plants for this purpose in that region being listed with *Tephrosia candida* and *T. purpurea* at the top of the list.

An important feature of the book is the appendix, contributed by the editor of *Tropical Life*. This is devoted to a discussion of the Dwarf or King Coconut in the Federated Malay States with special reference to its commercial possibilities. Dwarf coconuts have long been known in many parts of the Tropics but their planting on a large commercial scale is only recent. Reference is made to a planting in 1912 of 500 acres of this variety and the results are being noted with much interest, chiefly because of the well-known habit of this variety to come into bearing extremely early, a small commercial yield being looked for in the fourth year.

The book, which is very readable, is increased in interest by the free use of illustrations.

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[1] By Munro, R. W. and Brown, L. C., Second edition with appendix. London, 1920.

COLLEGE AND ALUMNI NOTES

About 450 students of the Association Institute of Manila visited the College on September 4. At a meeting held in the auditorium Mr. Love, general secretary of the Y. M. C. A., outlined the plans for the new Association branch at the College. Land has already been acquired and plans have been made to go ahead with the construction of a building. In the meantime, it is planned to construct a temporary structure to house the offices and reading rooms. A long felt need will be supplied with the establishment of a branch of the Young Men's Christian Association at the College of Agriculture.

A group of science students of the Batangas Provincial High School visited the College on September 18. They carefully examined the laboratories and equipment of the various departments. Dr. Roxas, of the department of chemistry, delivered an interesting lecture to them in the afternoon.

Dr. George W. Groff, professor of horticulture and director of agricultural work at the Canton Christian College, Canton, China, visited the College in August while enroute to the United States. Dr. Groff is a collaborator of the Bureau of Plant Industry of the United States Department of Agriculture. He stayed at the College for about two weeks and while here made a careful study of the citrus orchard.

Dr. Crampton, a world famous scientist, professor of zoology at Columbia University, and curator of the Museum of Natural History of New York, visited the College in September. Dr. Crampton was on a trip to the South Seas and had already visited Samoa and Guam before coming to the Philippines. He has made extensive exploration trips along the Amazon and in Guiana in South America.

A new mixed material building for the clinical department of the College of Veterinary Science has been completed. The farmers of the community have been quick to take advantage of the opportunity thus offered them to secure free treatment for their domestic animals.

The new laboratory building of the College of Veterinary Science and Medicine has been completed. It is occupied by a bacteriology laboratory, classrooms, and offices.

Funds for the new student houses have been released. The lumber is on hand and it is hoped that the houses will soon be finished. The new houses will solve to a considerable extent the housing problem.

Three houses have been recently built on Faculty Hill. The new houses are for Professor Cuzner, and for the faculty of the School of Forestry.

H. E. Woodworth has been appointed professor of entomology in the College of Agriculture. Professor Woodworth arrived to assume his duties on September 15, 1920. He was formerly with the California State Board of Health on mosquito work; Professor of zoology and entomology in the San Francisco Veterinary College; and one of the County Horticultural Commissioners to the State of California. During 1917-18, Professor Woodworth served in the United

States Army in the capacity of Lieutenant in the field artillery. He received the degree of Bachelor of Science from the University of California in 1917.

Dr. Guy Potter Benton, formerly President of the University of Vermont, visited the College of Agriculture on December 8. Dr. Benton was Educational Adviser to the United States Army of Occupation during the war and is now connected with the Department of the Philippines, United States Army, in a similar capacity. He is being spoken of as a possible President of the University of the Philippines. He is an educator of international reputation.

Dr. Jose Sison Mirasol returned from the United States November 20 and immediately assumed his position as a member of the faculty of the College of Agriculture. Dr. Mirasol studied at the University of Illinois as a Fellow of the University of the Philippines. His major was soils and his minor was agricultural economics. Dr. Mirasol's thesis subject was, "Aluminum as a factor in soil acidity."

Doctor S. T. Kuwana, head of the Imperial Japanese Plant Quarantine Service, visited the College from December 2 to 5 making a special study of insect and fungus pests. He took specimens of insects from the department of entomology and specimens of citrus scales and fungi from the department of plant pathology. From Manila, Doctor Kuwana went to Hongkong, enroute through Singapore for Ceylon and India. He expects to return to Japan in March.

Mr. J. L. King of the Bureau of Entomology of the United States Department of Agriculture visited Los Baños and the College December 9 to 12. Mr. King arrived in Manila on the U. S. A. T. *Thomas* enroute for Yokohama where he goes to search for parasites of the Japanese beetle, a pest imported into the United States from Japan which is spreading rapidly and causing considerable damage in the eastern states.

The herd of Hereford bulls which the Animal Husbandry Department recently received for detention from the Bureau of Agriculture are being distributed throughout the Islands. Ten have been sent to the Mountain Province; ten to Salinas, Nueva Vizcaya; and three to the Department of Agriculture and Natural Resources for stock improvement and propagation.

The Faculty of the College of Agriculture adopted at its last meeting the following resolutions:

> *Whereas*, Mr. R. G. McLeod, Division Superintendent of Schools for the Province of Laguna of the Philippine Islands has been transferred from said division; and
>
> *Whereas*, he has served in said capacity for nearly twenty years; and
>
> *Whereas*, he has always exhibited in said service sterling qualities of character: probity, wisdom, and courage; and
>
> *Whereas*, he has effected in this Province an unusually satisfactory condition of schools, both in personnel and equipment, leaving no stone unturned to improve the welfare of that most vital of democratic institutions, the free public school; and
>
> *Whereas*, he did in the early days of this College, render no small service in the establishment thereof under difficulties, now little realized,

working with all energy and good sense to support the plans of our pioneers, to the end that success might be ours; and

Whereas, he has since its foundation, afforded the College the highest degree of co-operation, working with unselfish and kindly goodwill to increase its strength and reputation, showing at all times a ready appreciation of the relation that properly exists between the common schools and the colleges of a national university, be it

Resolved, that we the faculty of the College of Agriculture of the University of the Philippines, do hereby express our deep gratitude for all Mr. McLeod has accomplished in our behalf, for the advancement of public education in this Province, for the keen zeal he has manifested for the agricultural welfare of these Islands, and for the unqualified example he has furnished of a loyal, efficient, public servant; and be it further

Resolved, that copies of these resolutions be sent through the Dean of the College of Agriculture and the President of the University of the Philippines to him, to the Director of Education, and to the Secretary of Public Instruction and that these resolutions shall be published in the *Philippine Agriculturist*.

Signed at Los Baños, Laguna, November 10, 1920.

On Saturday, October 2, students of the University High School visited the College for a general outing. During the afternoon a dance was held in the new chemistry building.

The senior class of the National Academy of Manila visited the College on September 26 on a combined pleasure and study trip. After visiting the laboratories and culture plots, the party enjoyed a picnic lunch.

Mr. Jose Escaler, former acting president of the University of the Philippines, has been elected president of the Agricultural Congress.

The new chemistry building is rapidly approaching completion and will soon be ready for occupation. A description of this spacious addition to the College buildings will be given in these pages in a later number.

The Makiling Cinema opened on October 1. The plan is to give shows on Friday and Saturday nights. This will provide a clean, wholesome recreation for the students on the Campus. It is expected that the patronage of the Student Body will insure its success.

The Laguna Baseball League opened on October 1 and closed November 7. Teams from Calamba Sugar Estate, Camp Eldridge, Laguna High School, and the College of Agriculture were the members of the League. The Calamba Sugar Estate team won the pennant, being easily the best nine in the league, if not the best in the vicinity of Manila. The Camp Eldridge team, one of the best Army nines in the Philippines, gave Calamba a hard fight and gained second place. Laguna High School team broke even with the College but managed to win one game each from Calamba and Eldridge early in the season and occupied third place. The important thing for the College team was the excellent practice obtained which stood them in good stead in the intercollegiate series.

FOREST SCHOOL NOTES

The Forest School has shipped six crates of bamboo cuttings to Santo Domingo for planting. The shipment included five species and they were shipped via the United States.

The forest nursery and arboretum has been moved from its old site back of the Foxworthy cottage to a new location within the Mount Makiling Forest Reserve and is now located about 100 meters from the school building. It occupies two hectares and over 500 species are represented, including timber and ornamental trees, shrubs, vines, and herbaceous plants. Steps are being rapidly taken to improve and extend the nursery.

Through the kindness of Mr. Egan, nurseryman for the city of Manila, the Forest School has secured about 120 species of ornamental plants, not previously represented in its nursery, from the Cementerio del Norte.

Instructor Oro spent a week in October studying lumbang, baglumban, and gogo in the province of Cavite.

The Class of 1921 spent its summer camping season near Lobo, Batangas, engaged in reconnaissance work. The country was very rough and therefore hard to map.

The Class of 1921 will spend a week or ten days at Laguimanoc, Tayabas, engaged in a reconnaissance of the mangrove swamps. The work will be under the direction of Forester Zschokke and Rangers Sulit and Demassa.

At its September meeting the Philippine Forest Club enjoyed a very pleasant and profitable talk by Professor Reinking on Siam.

Rangers Calixto Mabesa and Mariano Castillo have resigned from the Bureau of Forestry and left the Forest School. Mr. Mabesa will continue his studies in the United States and Mr. Castillo will enter the lumber industry in the Philippines.

THE YEAR'S ATHLETICS

THREE PLATES

The year's athletic season at the College of Agriculture has closed with an unprecedented record. All three of the University championships—baseball, basketball, and track and field—were won by the College of Agriculture by large margins over their competitors. The athletes of the School of Forestry and of the first three years of the College of Veterinary Science were united with those of the College of Agriculture in all athletic activities. Professor Otto A. Reinking, as athletic director of the College, and his various coaches are to be highly complimented on the excellent training given the contestants. The Student Body has every reason to feel proud of the teams which they supported with vigor. The contestants themselves should enjoy the realization of hard work well done, with true and clean sportsmanship.

BASEBALL

By a decision of the Board of Athletic Control at their meeting in October the College of Agriculture was awarded the Malcolm baseball trophy—a handsome silver cup—for the season of 1919-1920. It had previously been claimed by the College of Education, which together with the College of Liberal Arts was disqualified by the Board for allowing ineligible players to compete on their intercollegiate teams.

The present season found the baseball team of the College of Agriculture well prepared for the fight by virtue of previous rigorous training under Coach Wodrazka in the strong Laguna League. The intercollegiate series opened on November 13 and closed December 18. The Agriculture team experienced no difficulty in defeating those of the College of Liberal Arts, Medicine, and Education, out-playing and over-scoring them in every game. The team was composed as follows:

Batica and Collado, pitchers.
Gordon and Adamos, catchers.
Alejandro, first baseman and captain.
Avanceña, Sanchez, Suarez, and Diaz, infielders.
Mabbun, Goco, Salazar, and Mamaril, outfielders.

The result of the season gives the College of Agriculture the Malcolm cup for 1920-1921—for the second successive year. Baseball enthusiasts at the College are already planning to capture the cup next season which will give them permanent possession of the coveted trophy.

BASKETBALL

The basketball season for 1920 was the most successful in the history of the College. The College of Agriculture team closed the intercollegiate series on October 20 as undefeated University champions, having played the following games with the scores indicated:

Agriculture, 44, vs. Education, 5.
Agriculture, 58, vs. Medicine, 7.
Agriculture, 46, vs. Engineering, 5.
Agriculture, 84, vs. Law, 12.
Agriculture, 104, vs. Liberal Arts, 9.

In addition to the above, four post-season games have been played with results as follows:

Agriculture, 78, vs. Sternberg Hospital, 5.
Agriculture, 12, vs. Manila High School, 7.
Agriculture, 41, vs. Central Luzon Agricultural School, 14.
Agriculture, 61, vs. Central Luzon Agricultural School, 9.

The total scores of the College of Agriculture team was 538 and those of its opponents, 73. The fine record of the team was due to Coach Reinking's success in instilling sincere team-work into the players. Careful, short, forward passing with four men playing the basket featured every contest. Well-grounded in every phase of the game and provided with very clever plays, the team drew large crowds of students and visitors each time they played. Erlanger and Galinger presented a fine Reach banner as a trophy for the intercollegiate championship.

The team was composed of:

Rabaya, center and captain.
Salazar and Soliven, forwards.

Lemos and Antenor-Cruz, guards.
Sanchez, Ponce, and Obregon, substitutes.

The team will be entered to represent the University in the Carnival.

TRACK AND FIELD

The track and field season opened on October 29 and 30 with the Intramural Track and Field Meet. The students were divided into three groups based on their home districts. Contestants from the Ilocos provinces, Cagayan, Batanes, Isabela, Nueva Vizcaya, Nueva Ecija, Pangasinan, and Zambales composed the Northern district; those from the remaining provinces of Luzon formed the Central district; and those from the Visayas and Mindanao-Sulu made up the Southern district. A complete frame of events, including the javelin throw and an individual three-mile cross-country run was carried through with the following scores:

Southern district, 56.
Northern district, 54.
Central district, 34.

Each contestant winning a first place received a bronze medal donated by the members of the Faculty Hill Mess. The highest individual point winner, Rabaya, of the Southern district, and the winner of the cross-country run, Sanchez, of the Central district, was each awarded a silver medal by the Athletic Association of the College of Agriculture. The winners of the meet, the Southern district, were presented with a Spalding cup by the Manila Trading and Supply Co. Great enthusiasm and keen competition on the part of the Student Body and the athletes marked every event of the meet. Coach Woodworth and his assistants are to be commended for the training of the athletes and Director Reinking for the supervision of the meet.

The Intercollegiate Track and Field meet was held on the University Campus in Manila on November 25. The College of Agriculture was represented by a well-balanced team of twenty men, picked from the winners of the Intramural meet. The standings of the various schools and colleges of the University were as follows:

Agriculture,	81½
Law,	34½
Medicine,	9
Engineering,	5
Education,	3
Liberal Arts,	1

The meet was featured by the excellent individual records of Santos of Law, 25 points; Rabaya of Agriculture, 16 points; Salazar of Agriculture, 15 points; and by the 880 and mile relay teams of Agriculture.

Each point winner received a medal from the Board of Athletic Control of the University. Cups were provided for each relay team and for the highest individual point winner. The winning team was awarded the Kemp three-year cup and a meet cup provided by the Board of Control. All of the cups, except

that for the highest individual point winner, were awarded to the College of Agriculture.

It is to be hoped that the high spirit of endeavor shown by our athletes this year will become traditional in the College. Nothing in student activities is so indicative of true character and manliness as spirited, clean sports.

Be strong and quit yourselves like men.—*Bible.*

PLATE I. COLLEGE OF AGRICULTURE BASEBALL TEAM.

PLATE II. COLLEGE OF AGRICULTURE BASKET BALL TEAM.

PLATE III. COLLEGE OF AGRICULTURE TRACK TEAM.